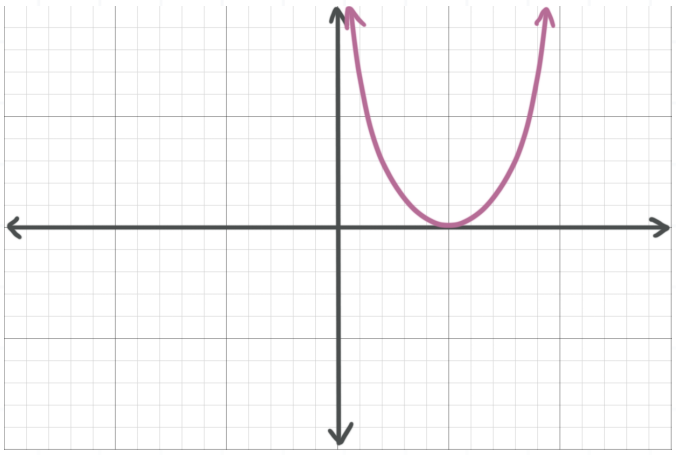
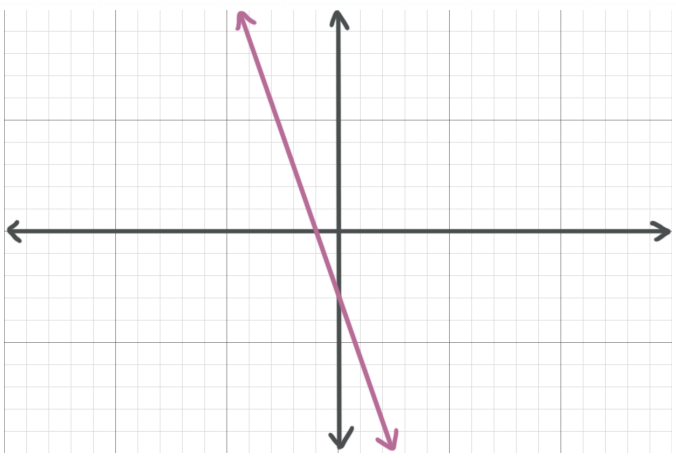
Topic: Sketching f(x) given the graph of f'(x), or vice versa

Question: Given the following graph of $f(x)$, which is a possible graph of $f'(x)$?

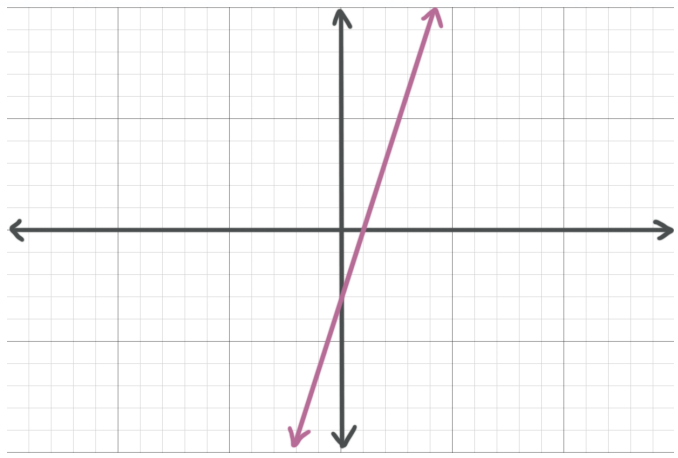


Answer choices:

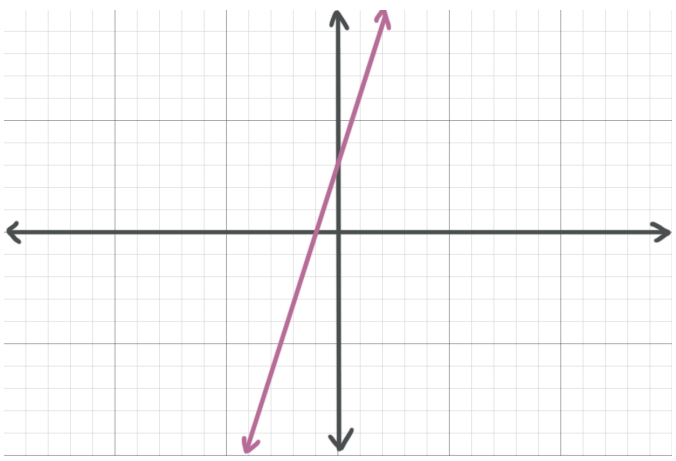
A



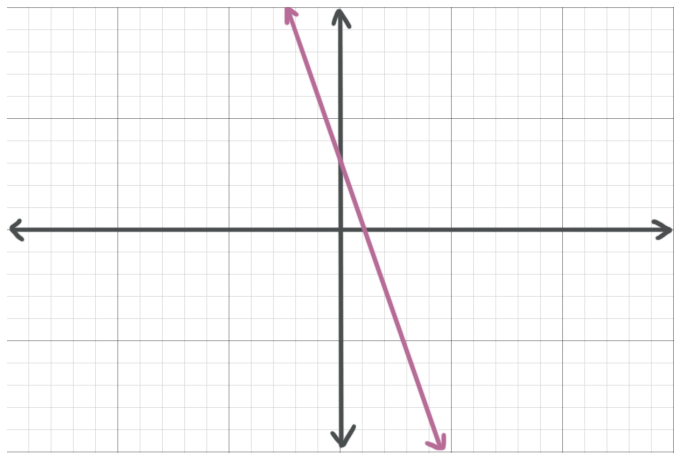
B



C



D



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Solution: B

To take a sketch of $f(x)$ and translate it into a sketch of a possible $f'(x)$ or vice versa, use the information in the following chart.

f(x)	f'(x)
Increasing	Positive (above the x-axis)
Decreasing	Negative (below the x-axis)
Concave up	Increasing
Concave down	Decreasing
Critical point	x-intercept
Inflection point	Critical point

To solve, let's look at the graph and identify where the graph is positive (above the x-axis), negative (below the x-axis), increasing, where the x-intercepts exist, and were there may be critical points.

For this graph, we can see that the graph is decreasing until it hits the x-axis, there is a critical point where it hits the x-axis, the graph is increasing from the critical point on and the graph is concave up. Using the chart, this means that the graph will be below the x-axis until the critical point, the critical point will be the x-intercept still, the graph will be above the x-axis from the critical point on and the graph will be increasing.

Answer choice A is incorrect. The graph is decreasing and we know the correct answer will have a graph that is increasing.

Answer choice B is correct. The graph is below the x-axis until the critical point, the critical point is the x-intercept, the graph is above the x-axis from the critical point on and the graph is increasing.

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Answer choice C is incorrect. The graph is increasing but the critical point which will be the x-intercept is a negative value for x and in our graph the critical point has a positive value for x.

Answer choice D is incorrect. The graph is decreasing and we know the correct answer will have a graph that is increasing.

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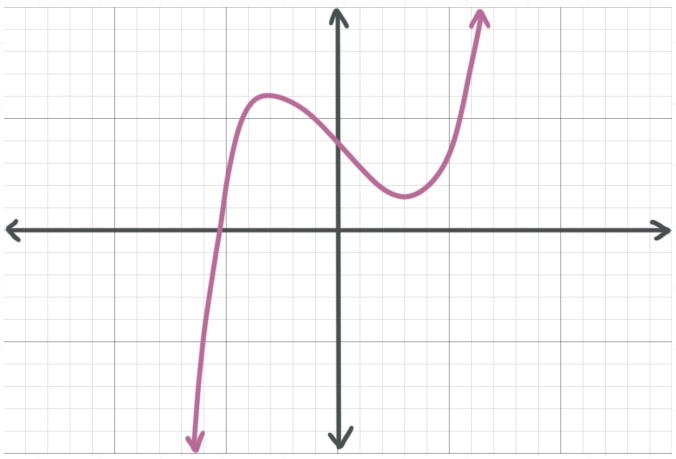
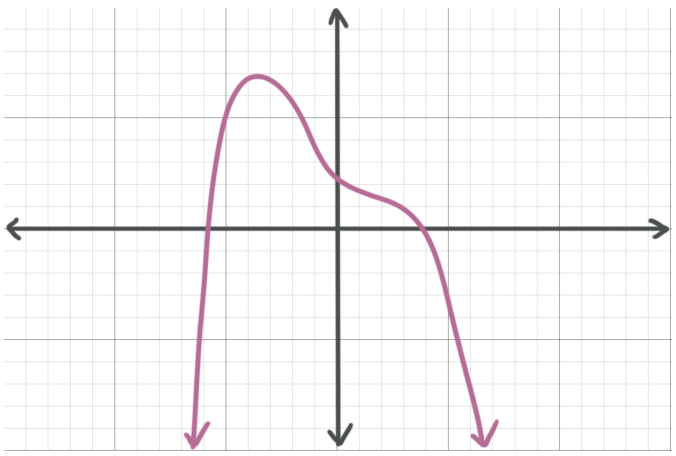
Question: Given the following graph of $f'(x)$, which is a possible graph of $f(x)$?

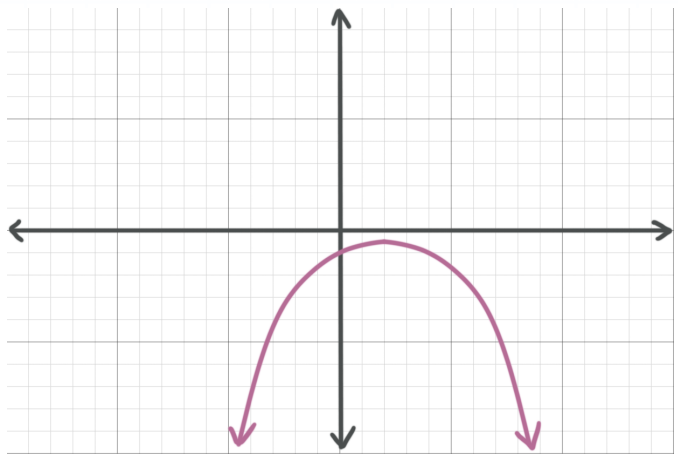


Answer choices:

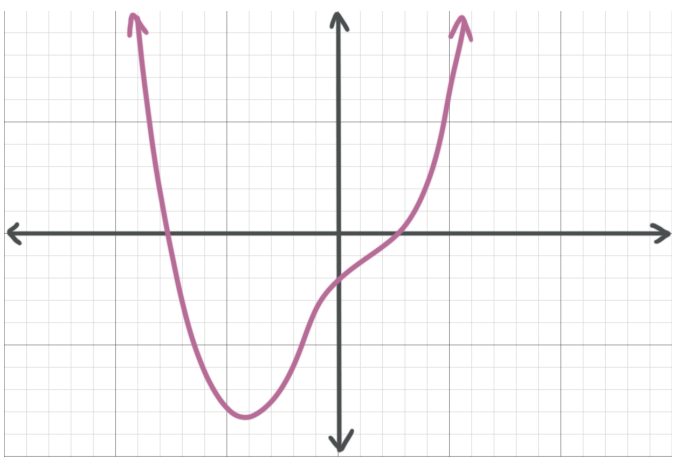
A



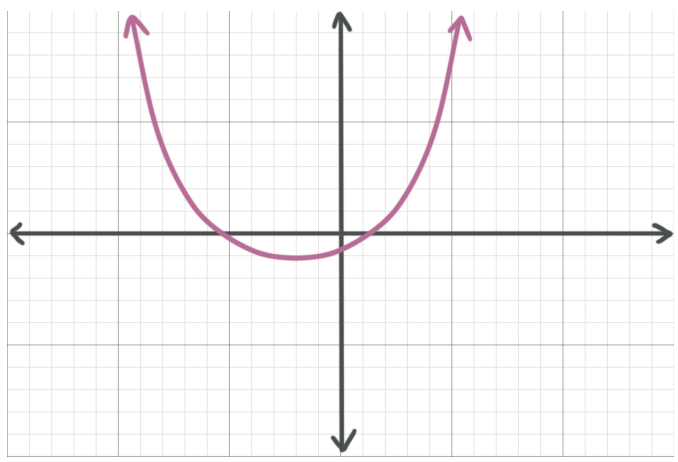
B



C



D



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Solution: C

To take a sketch of $f(x)$ and translate it into a sketch of a possible $f'(x)$ or vice versa, use the information in the following chart.

f(x)	f'(x)
Increasing	Positive (above the x-axis)
Decreasing	Negative (below the x-axis)
Concave up	Increasing
Concave down	Decreasing
Critical point	x-intercept
Inflection point	Critical point

To solve, let's look at the graph and identify where the graph is positive (above the x-axis), negative (below the x-axis), increasing, where the x-intercepts exist, and were there may be critical points.

For this graph, we can see that the graph is increasing until it hits a critical point, decreasing until it hits another critical point and then increasing again. Also the graph is initially below the x-axis, so it is negative, and then it is positive for the rest of the graph. There is one x-intercept as well.

Using the chart, this means that the graph is decreasing until it hits a critical point, then it is increasing and concave up until it hits an inflection point, next concave down until it hits another inflection point and finally concave up.

Answer choice A is incorrect. The graph is increasing and then decreasing but we know the correct answer will have a graph that is decreasing and then increasing.

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Answer choice B is incorrect. The graph is increasing and then decreasing but we know the correct answer will have a graph that is decreasing and then increasing. There are no inflection points, and it's missing two concave up sections.

Answer choice C is correct. The graph is decreasing until it hits a critical point, then it is increasing and concave up until it hits an inflection point, next concave down until it hits another inflection point and finally concave up.

Answer choice D is incorrect. There are no inflection points and it is missing one concave up section and one concave down section.

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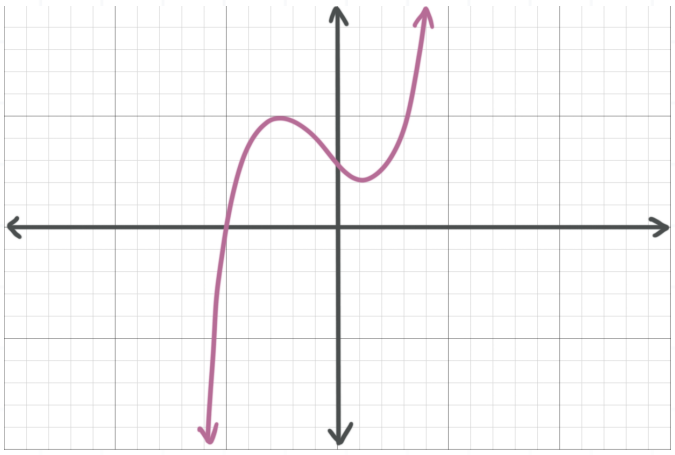
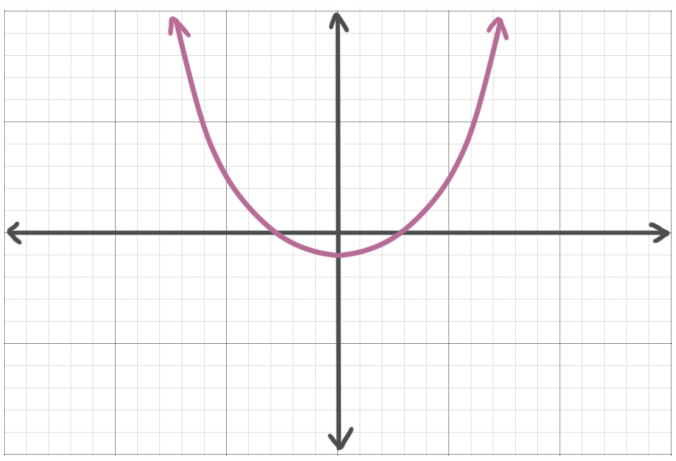
Question: Given the following graph of $f(x)$, which is a possible graph of $f'(x)$?

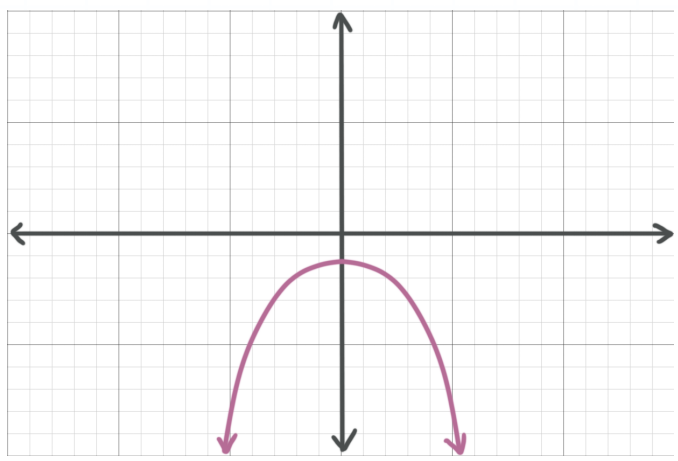


Answer choices:

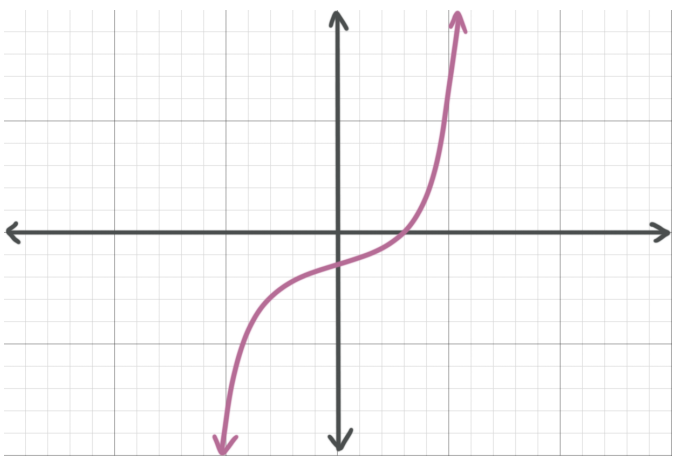
A



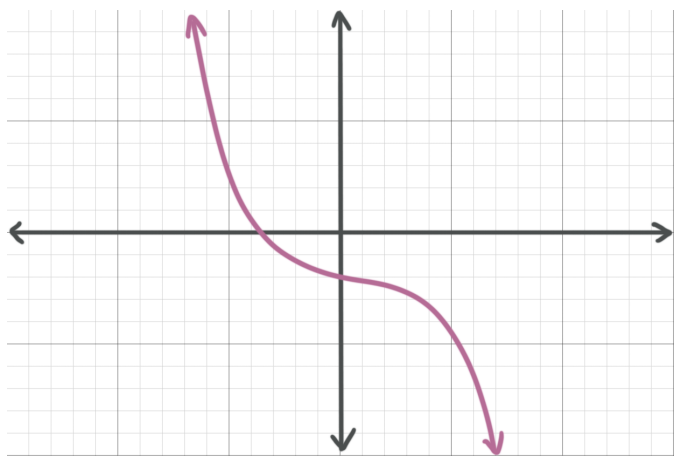
B



C



D



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Solution: A

To take a sketch of $f(x)$ and translate it into a sketch of a possible $f'(x)$ or vice versa, use the information in the following chart.

f(x)	f'(x)
Increasing	Positive (above the x-axis)
Decreasing	Negative (below the x-axis)
Concave up	Increasing
Concave down	Decreasing
Critical point	x-intercept
Inflection point	Critical point

To solve, let's look at the graph and identify where the graph is positive (above the x-axis), negative (below the x-axis), increasing, where the x-intercepts exist, and were there may be critical points.

For this graph, we can see that the graph is increasing until it hits a critical point, decreasing until it hits another critical point and then increasing again. Also the graph is concave down, then it hits an inflection point and changes to concave up. Using the chart, this means that the graph is above the x-axis until it hits the critical point, then below the x-axis from the critical point through the inflection point until the second critical point and then it is above the x-axis again. Also the graph is decreasing until the inflection point and then it is increasing. There are two x-intercepts that correspond to the critical points. Finally there is a critical point where the inflection point was.

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Answer choice A is correct. The graph is above the x-axis until it hits the x-intercept, then below the x-axis from the x-intercept through the critical point until the second x-intercept and then it is above the x-axis again. Also the graph is decreasing until the critical point and then it is increasing. There are two x-intercepts that correspond to the critical points. Finally there is a critical point where the inflection point was.

Answer choice B is incorrect. There should not be an inflection point in the $f'(x)$ graph.

Answer choice C is incorrect. The graph is increasing until the critical point and then it is decreasing when it should be decreasing until the critical point and then increasing.

Answer choice D is incorrect. There should not be an inflection point in the $f'(x)$ graph.

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